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The instability of highly racially diverse residential neighborhoods in the United States

Wright, R., Ellis, M., Holloway, S. R. & Catney, G.

There are so few data points, because there are so few racially
integrated communities in the United States (Sugrue 2017)

A growing number of studies investigate increases in neighborhood racial diversity in the United States (e.g., Clark et al. 2015; Ellen et al. 2012; Farrell and Lee 2011; 2018; Fowler et al. 2016; Friedman 2008; Lee et al. 2014; Logan and Zhang 2010; Pinto-Coelho and Zuberi 2015; Zhang and Logan 2016). While there are, without doubt, more racially diverse neighborhoods than before, the trend should not be thought of as unidirectional and, with a nod to the subtitle of Logan and Zhang’s 2010 paper – “new pathways to diversity and separation”, we seek to investigate some of the dynamics of racial diversity at the neighborhood scale. Specifically, we are interested in the prevalence of highly racially diverse neighborhoods, their (in)stability, and the routes and mechanisms that lead to (and from) such a mix.

Few metropolitan neighborhoods in the US remain untouched by increased racial diversity. At one extreme, 100 percent monoracial census tracts are a thing of the past (Glaeser and Vigdor 2012). In the middle ranges of tract diversity, some of the most

widespread changes are occurring in tracts that used to be over 80 percent White; a substantial proportion of such tracts have transitioned to being moderately diverse (50-80 percent), White majority (e.g., Ellis et al. 2017). At the other extreme, the number of highly racially diverse neighborhoods has increased since 1990, attracting new attention (e.g., Walton and Hardebeck 2016; Lumley-Sapanski and Fowler 2017; Zhang and Logan 2016). Together, these highly racially diverse tracts are a powerful lens through which to view racialized urban processes of neighborhood formation (Krysan and Bader 2007). Racial mixing in tracts used to be exclusively associated with a temporary, transitional state, from Black to white or white to Black (Schelling 1971). Researchers are finding that in some contexts, these new residential racial diversities are different, producing a stable integration of whites and non-white groups, especially Asians and Latinos (e.g., Logan and Zhang 2010). This new dynamic has its limits, however. In other instances, as tract diversity increases above a moderate level white exit often accelerates and their entry declines. This raises the question of whether census tracts that are *highly* diverse continue as unstable spaces of transition. If the highest diversity spaces are merely transitory, how does that change the story about the evolution of multiracial metropolitan landscapes?

Most research on highly diverse neighborhoods tends to rely on analyses of particular places (e.g., Lumley-Sapanski and Fowler 2017; Walton and Hardebeck 2016) or of particular metropolitan areas (Bader and Warkentien 2016). Case studies offer distinct epistemological and methodological advantages, allowing scholars to blend qualitative

and quantitative data to analyze aspects of community that are unavailable at a more aggregate scale. Analyses of a sample of metropolitan areas are, by definition, partial. The research in this paper is different. It reports on an analysis of all highly racially diverse census tracts in the United States over a 20-year period. It is among the first efforts to systematically analyze these tracts and provides insights that both complement and augment more fine-grained investigations. Threaded throughout is a concern about stability. Are these neighborhoods really “increasing in number and stability” (Lumley-Sapanski and Fowler 2017: 87), prompting questions about how and where they emerge? Or, rather than being durable, do many of them represent a temporary, transitional state, leading to questions about the nature of their transitions (Bader and Warkentien 2016; cf. Lee and Hughes 2014)?

Building on previous analyses of neighborhood-scale dynamics, our study connects racial population and diversity dynamics at the metropolitan scale with those at the tract scale (e.g., Crowder et al. 2012; Reibel and Regelson 2011). We model several metropolitan determinants of highly diverse tract *transitions* across the 1990, 2000, and 2010 censuses, deriving four variables from the literature and our own theorization: metropolitan area size, metropolitan area diversity, change in metropolitan area diversity, and metropolitan area percent Black. The next section of the essay explains these selections with reference to some of the previous research on neighborhood diversity and arrives at a definition of a racially diverse place. That is followed by our analysis and a discussion of the implications of our research.

RACIALLY DIVERSE CENSUS TRACTS

Durability and Instability

Residentially diverse census tracts are important locations. They represent the polar opposite of residential spaces where intergroup living and interaction is impossible because each group lives in isolation from others. Social scientists, often building expressly on Gordon Allport's work (1954), have considered whether the coming together of different groups enhances opportunities for intergroup contact and conviviality, reducing prejudice and building trust (e.g., Dixon, Durrheim, and Tredoux 2005). In terms of neighborhoods, if places that once were predominantly White are now more mixed—this could signal the erosion of White privilege or possibilities for intergroup contact that could lead to such an erosion and, in many instances, a new level of access to neighborhood resources and improved life outcomes for non-Whites (Rosenbaum 1995; Clampet-Lundquist and Massey 2008). The physical separation of groups is not in and of itself a bad thing in the absence of racial hierarchies and racism. But such a social world does not exist and, in actuality, the spatial isolation of groups, particularly of Whites, reflects and maintains the racial hierarchy in the US (Delaney 1998). While overt discrimination in many walks of life is outlawed, White supremacist ideologies continue to shape life outcomes and remain central to social relations (e.g., Bonilla-Silva 2001; Desmond and Emirbayer 2010; Omi and Winant 2014), interpersonal

interactions and intermarriage (e.g., Mouw and Entwistle 2006; Wright et al. 2013), and neighborhood composition and its implications for wealth and wellbeing (e.g., Howell and Emerson 2017; Oliver and Shapiro 2006; Sharkey 2013; Valentine 2008).

Under these conditions, highly diverse neighborhoods, especially the persistence of these spaces, represent an important exception. A series of papers in *Demography* in the early and mid 1990s kicked off the recent round of scholarly attention. Denton and Massey (1991) examined neighborhood transition “in a multiethnic world” and found that census tracts with multiple groups were on the increase and were especially prone to transition. They also determined that minority groups were especially drawn to living in diverse neighborhoods. Whites, however, avoided neighborhoods where they would be outnumbered. Clark (1992), focusing on stated neighborhood preferences, discovered that all groups prefer not to be outnumbered but that Whites had an especially large preference for same-race neighbors. Such preferences suggested the long-term maintenance of largely mono-racial neighborhoods and corresponding instability in mixed residential spaces. Clark's results hinted at the potential for an alternative future, finding unrealized preferences for more diverse neighborhoods among a small percentage of all groups, but especially Blacks.

Neighborhood racial diversity in this literature was often associated with a temporary, transitional state, from White to Black or Black to White (e.g., Schelling 1971; Lee and Wood 1991; Sin and Krysan 2015). The accompanying theorizing involved the racial

composition of neighborhoods with two groups in mind. But what of neighborhood compositional dynamics that involve the significant presence at least three racialized groups? Elements of the two-group theories translate into these new contexts, such as the idea that preferences for living near same-race individuals impels the socio-spatial distancing of Whites from non-Whites, no matter the racial identification of those non-Whites. Similarly, place stratification theory, which focuses on the institutional structures that prevent non-Whites (notably Latinos and Blacks) from actualizing their preferences to live in neighborhoods with high percentages of Whites (e.g., Alba and Logan 1993; Charles 2003), suggests the continuation of two group neighborhood transition dynamics even as the non-White population diversifies from being largely Black alone.

Other theories, however, directly address multi-group neighborhood dynamics. For example, the buffer hypothesis (Frey and Farley 1996) holds that Latinos and Asians offer what Zhang and Logan (2016: 1934) call “a social cushion” between Blacks and Whites in mixed neighborhoods, ameliorating potential racial tensions between Whites and Blacks and lessening the likelihood of White exit. In addition, recent research explored the unique local conditions in neighborhoods that have experienced durable racial integration in Boston (Walton and Hardebeck 2016) and South Seattle (Lumley-Sapanski and Fowler 2017).

Scholars also make the case that, in addition to local frames, the intermediate, metropolitan scale helps mediate the production and possible durability of highly racially

neighborhoods (Crowder et al. 2012; Reibel and Regelson 2011). Given our ambition to conduct a broad analysis of all highly diverse tracts, these connections between metropolitan-scale processes and tract-scale processes especially interests us. It provides the means to conduct an analysis that incorporates some, or all, metropolitan areas in the US. Specifically, we examine the effect of four metropolitan characteristics on the formation and transition dynamics of highly racially diverse tracts.

Metropolitan population size may matter in two, opposing, ways. Relatively large metropolitan areas generally have larger counts of various racialized groups. Thus, we can hypothesize that the larger the metropolitan area, the greater the *potential* for highly diverse tracts to form. Larger multigroup populations, however, increase the odds of realizing same-race neighborhood preferences (Crowder et al. 2012), which has the potential to increase the instability of diverse neighborhoods after formation.

Despite a correlation between metropolitan population size and racial diversity, highly diverse metropolitan areas are not always large (Lee and Sharp 2017). Thus, we also include a measure of *the level of metropolitan diversity*. Metropolitan-scale diversity may drive the formation and enhance the stability of highly diverse neighborhoods because highly diverse metropolitan areas tend to be associated with an elevated share what some call “global neighborhoods” as a fraction of their tract count (Zhang and Logan 2016). Additionally, diverse metropolitan areas could have a greater variety of majority population neighborhood types and thus metropolitan diversity will increase the breadth of *potential* pathways into and out of highly diverse neighborhood status.

Increases in metropolitan-scale diversity, not just its level, may lead to greater acceptance of racial others through contact (Allport 1954) and an associated willingness to share residential space with other groups (Frey and Farley 1996). In such circumstances, highly diverse neighborhood formation should accelerate and the stability of such spaces should increase. Iceland's (2004) findings of increased segregation with increasing metropolitan diversity for all groups except Blacks suggests this is not the only possibility. Greater metropolitan-scale diversity means increases in the populations of smaller demographic groups, enhancing the likelihood that members of these groups can move to realize their unmet preference for same-race neighbors (Clark 1992).

Previous research also suggests that the composition of diversity may also play a role. Black segregation from other groups is lower or declines faster in multiracial metropolitan areas because high percentages of other Asians and Latinos “buffer” rising Black presence in mixed neighborhoods (Frey and Farley 1996; Parisi, Lichter, and Taquino 2015). Does this finding extend to the particular case of the stability of the most highly racially diverse tracts? We investigate whether metropolitan areas with a *high percentage of Blacks* experience a depressed rate of high-diversity tract formation and an elevated rate of instability in their existing highly diverse tracts. It follows that instability in these circumstances will most likely generate a disproportionate fraction of transitions from highly diverse to Black majority. These variables—metropolitan area population, metropolitan-scale diversity and change in diversity, and metropolitan percent Black—

form the building blocks of our analysis. Before proceeding further, however, we must operationally define what constitutes a “highly” racially diverse tract.

Definition

Just as the causes of the changes in or durability of neighborhood diversity are complex and contingent, not surprisingly there is no agreed upon definition of a diverse place, let alone a highly diverse one (Krysan, Carter, and Van Londen 2016). One approach uses a fixed numerical threshold for group presence (e.g., Alba et al. 1995; Denton and Massey 1991). Tract populations, however, vary widely and this compromises comparative analyses using such a criterion. Another approach uses a referent, usually the metropolitan area’s (or country’s) racial composition (e.g., Nyden, Maly, and Lukehart 1997; see also Maly 2005) such that a tract, to be diverse must have greater diversity than the metropolitan area (country). (Nyden et al. 1997 also add other criterion, such a diverse place must have been recognized by local informants as such and must have maintained this racial mix for two consecutive censuses). The weakness of this method is that metropolitan areas vary considerably in their racial makeup so a “diverse” neighborhood in, say, Pittsburgh would not come close to meeting the standard in, for example, Los Angeles. Logan and Zhang (2010) deploy a variant of this method to define their “global neighborhoods” wherein the threshold for inclusion in a category changes over time as Latino and Asian population proportions in metropolitan areas increased. A third type of approach employs a threshold that applies to all census tracts, no matter their location or period. For instance, Walton and Hardebeck’s (2016) definition holds that a

tract must have maintained at least 10 percent representation of Blacks, Whites, Latinos, and Asians in each of past three decennial census years. Similarly, for Friedman (2008) a “multi-ethnic” census tract must be greater than 10 percent Black, greater than 10 percent another racialized group, and greater than 40 percent White.

Because we are interested in the drivers of highly racially diverse tract instability across metropolitan areas and time, we favor this third type of approach, with some caveats. Following Holloway et al. (2012), we consider highly racially diverse places are those census tracts where no one racialized group dominates (albeit at a different spatial scale, Farrell and Lee’s (2018) characterization of no majority census designated “places” echo this analytical position). Holloway et al. (2012) take this a little further with the requirement that no one group represents more than 45 percent of the tract's population, no two groups exceed 80 percent, and scaled entropy - the ratio of observed entropy to its theoretical maximum given six racialized groups - is greater than 0.74. Put differently, three different groups have to have a substantial presence and with none in a majority to meet these standards. The restriction of no one group exceeding 45 percent of a tracts population distinguishes this method from many others. For example, in the Friedman and Walton and Hardebeck schemas, Whites constitute more than half the tract population in 66 percent and 18 percent of tracts that meet their criteria in 2010. In Friedman’s system, one tract in 1990 was 79.2 percent White. In our view, such a tract is White majority, not highly racially diverse, and increasingly likely to be the dominant racial residential configuration for Whites (Ellis et al. 2017).

In 1990, only 197 (or 0.3 percent of) all US census tracts met Holloway et al.'s (2012) standard; by 2010, the count had risen to 998 (or 1.5 percent of all tracts). While this tally reflects Sugrue's comment in our epigraph, how does our taxonomy stack up against other scholars who have had to define "highly diverse"? Applying Samantha Friedman's (2008) definition of a "multi-ethnic" neighborhood, we found that 1552 of all US tracts met this standard in 1990, rising to 3791 in 2010. To triangulate further, 464 tracts in 1990, 928 in 2000, and 1433 in 2010 met Walton and Hardebeck's 10 percent threshold for the four racialized groups threshold; still a higher count, but more in line with our taxonomy. Recall, however, that these scholars applied the additional criterion that to qualify as very diverse, tracts had to remain above these thresholds across three consecutive censuses. We calculate that 170 census tracts in the United States met their criteria between 1990 and 2010: that is a 36.6 percent survival rate. Using Friedman's definition, of the 1552 tracts in 1990 that maintained their thresholds, only 283 were multi-ethnic in 2010: an 18 percent survival rate. In our schema, of the 197 highly diverse tracts in 1990, 59 remained so in 2010—a 30 percent survival rate. These comparisons demonstrate two things. First, while Holloway et al.'s (2012) method might be relatively more restrictive in terms of counts, with respect to survival rates it occupies a middle ground among these three taxonomies. Second, instability rather than stability characterizes these types of places regardless of how they are defined. Because our interest is in the stability of the most highly racially diverse residential neighborhoods, residential spaces where multiple groups are present and no one group holds a majority of

the population, we explore tract transitions associated with such neighborhoods as defined by Holloway and his co-authors.

ANALYSIS

We use the full count summary data from the 1990, 2000, and 2010 decennial US censuses. Holloway et al.'s approach identifies six self-identified racialized groups (White, Black, Asian, Latino, Native American, and Other) fixed in the 1990 Census and applied to 2000 and 2010 data.¹ These groups are the basis for entropy calculations that produce types of racial diversity categories for census tracts in 1990, 2000, and 2010 (cf. Farrell and Lee 2018; Walker 2016). More specifically, the scheme yields 13 tract categories: six low diversity categories by dominant racialized group, six moderate diversity categories by dominant racialized group, and a highly diverse category with no dominant group.²

We follow convention in much of the literature on neighborhood and race by conducting our investigation at the census-tract scale (e.g., Denton and Massey 1991; Massey and Denton 1993; Logan and Zhang 2010). Tracts are small areas, typically between 1200 and 8000 people, delineated with the intention of producing stable geographic units over time. Tract boundary changes do occur and most of these are accommodated with tract splits to account for population growth and aggregations for population decline. This consistency and ease of adjustment when change occurs across censuses is important for

neighborhood change analysis. To observe tract changes over time, the scheme sets tract boundaries to their 2000 Census delimitations using the 2000 and 2010 Census Tract Relationship Files (www.census.gov/geo/maps-data/data/relationship.html). Any tracts from the analysis that had fewer than 50 people in 1990, 2000, or 2010 were dropped. The tract data, including category assignments, entropy calculations and group population counts, are available at www.mixedmetro.com.

The Location of Highly Diverse Tracts

Before turning to the analysis, we document the number, location, and stability of highly diverse census tracts in the US. Previous research indicates that the drive to diversity, like one of its main engines -- immigration, is concentrated in metropolitan areas (e.g., Maly 2005; Sin and Krysan 2015; Walton and Hardebeck 2016), so not surprisingly, highly racially diverse tracts are found mostly in metropolitan areas, notably large ones. Table 1 shows that large metropolitan areas accounted for over 90 percent of all such tracts in all three decades. Between 1990 and 2010, this pattern of large-metropolitan bias weakened only slightly. Countering that trend, the proportion of all highly diverse tracts in the largest 10 metropolitan areas *increased* between 1990 and 2000, with these 10 places accounting for over two-thirds of all US highly diverse tracts. Table 1 also shows that the number of highly diverse tracts more than quadrupled between 1990 and 2000. That rate of growth was not sustained in the subsequent decade, cooling off to about 14 percent.

Table 1 here

The information in Table 2 unpacks the aggregate data in Table 1 to show which metropolitan areas contained the most highly diverse tracts. In the main, populous metropolitan areas boasted the biggest counts in each of the last three census years. But the correlation between metropolitan area size and highly diverse tract tally is imperfect. For example, not all large metropolitan areas appear in this table: Chicago is notably absent. In addition, in 1990, San Francisco had more highly diverse tracts than either New York or Los Angeles. Some places shifted ranking dramatically: metropolitan Washington DC had just 4 highly diverse tracts in 1990 but by 2010 the total count had swelled to 81, propelling it to third in the rankings. San Diego dropped out of the table—having had 22 highly diverse tracts in 1990 and 26 in 2000, this metropolitan area had but 13 in 2010. Sacramento occupies a prominent position given its size relative to many of the other places listed. In addition, while the total count of highly diverse tracts in this set increases over time, not all metropolitan areas follow this pattern; between 2000 and 2010, the count of these tracts dropped in Houston, San Francisco, and, most notably, Los Angeles.

Table 2 here

Instability in the spaces of mixing

One way to consider highly diverse-tract durability is to trace the attrition rate of tracts that were highly diverse in 1990. Table 3 shows metropolitan areas that had at least 20 highly diverse tracts in 1990, reporting the number of these tracts in 1990 and how many remained highly diverse 10 and 20 years later. Attrition occurs in all instances but the rate varies considerably by metropolitan area. In Los Angeles, this attrition was particularly acute: only 4 of 35 highly diverse tracts maintained their highly diverse classification across this 20-year time span. Sacramento again distinguished itself from the other three metropolitan areas: in 1990, Sacramento had 22 highly diverse tracts; none of these had shifted classification by 2000 and only 7 shifted classification (i.e., became less diverse) between 2000 and 2010.

Table 3 here

For these four metropolitan areas, the tracts that transitioned from being highly diverse tended to shift toward being majority Asian or majority Latino between 1990 and 2000. Table 4 expands on this, showing the stability of all highly diverse tracts using counts of transitions for all highly diverse tracts in all metropolitan areas.

Table 4 here

Almost 47 percent of tracts that were highly diverse in 1990 shifted to moderately diverse by 2000. In the subsequent decade, a very similar proportion of tracts transitioned from

highly diverse status to some other moderately diverse state—46 percent. Half of these shifts involved transitions to moderately diverse tracts with a Latino majority. Another 20 percent of them, 80 in total, however, shifted to White majority, a far greater proportion than transitioned in this fashion during the previous decade. These transition data indicate that highly diverse tracts are not stable; almost half transitioned to some other status in each of the two decades under investigation.

On the other side of the ledger, Table 4 makes clear that the majority of highly diverse tracts in 2000 were moderately diverse in 1990, and most of those were White majority. Eighteen low diversity White dominated tracts and one low diversity Black dominated tract also contributed to the tally of highly diverse tracts in 2000, along with a couple of other tracts (both rare in metropolitan settings: one majority native American and the other having a majority of people claiming some other race). Between 2000 and 2010, the number of metropolitan tracts transitioning to highly diverse declined from 764 to 502. This drop occurred mainly because the number of transitions from moderately diverse White tracts declined by 226.

Many of the changes are driven by the increasing presence of Asians and Latinos. Between 1990 and 2000, tracts that transitioned from highly diverse trended decisively toward either Latino- or Asian-dominated tracts. In the subsequent decade, these patterns shifted: while the highly diverse to moderately diverse Latino pattern was maintained, fully 20 percent of all the tracts' transitions from highly diverse shifted to moderately

diverse and White. The transition of a growing fraction of highly diverse tracts to being majority White suggests that the process is not just about the growth or entry of non-White populations or White exit.

Modeling high diversity tract transitions

We next ask: do metropolitan areas vary in the rates of these transitions as a function of the four metropolitan area characteristic identified above? We explore the effects of such characteristics using two models, one that assesses tract transitions *from* high diversity over the decade between censuses, and a second that appraises transitions *into* high diversity over the same period. Let $m_{jt+10|hd}^k$ be the number of high diversity *hd* tracts at time t in metropolitan area k that transition to some other tract category j by $t+10$. M_{hd}^k is the total number of high diversity tracts in metropolitan area k at time t . Using this notation, we can model the number of tract transitions *from* high diversity using a count model:

$$m_{jt+10|hd}^k = M_{hd}^k \exp(\gamma_j D_j + \delta_j D_j Y_t + \beta_j D_j X_{kt}) \quad (1)$$

where D_j are factors representing the tract categories to which high diversity tracts transition over a decade³, Y_t is a binary factor for time period (i.e., 1990-2000, 2000-2010), and X_{kt} is a vector of mean-centered predictors for metropolitan area k .

The number of potential transitions from high diversity tracts from t to $t+10$ in each metropolitan area depends on the total number of high diversity tracts in that metropolitan area at time t . The offset term, M_{hdt}^k , accounts for this potential and converts the estimates of the count model into transition probabilities. Accordingly, the γ_j are the estimated probabilities of transition from high diversity status to some other tract category at the mean centered values of the metropolitan predictors, δ_j estimates whether those transition probabilities change over the two decades, and the β_j are estimates of the adjustments of those probabilities for metropolitan characteristics. To directly measure the stability of high diversity tracts, the excluded factor from D_j is high diversity tracts, which means the constant term measures the probability of high diversity tract stability. Accordingly, the δ_j and β_j main effects measure the effect of temporal change and metropolitan variables on this stability. The remaining δ_j and β_j coefficients measure these effects transitions away from high diversity status to different types of neighborhood with a majority group.

The sample for this model is necessarily restricted to metropolitan areas with high diversity tracts at time t (i.e., $M_{\text{hdt}}^k > 0$). Each metropolitan area has five transition counts as observations, which are for the five tract types that register an observed transition from high diversity tracts in the set of all US metropolitan areas (these are transitions counts from high diversity to: high diversity, moderately diverse White, moderately diverse Black, moderately diverse Asian, and moderately diverse Latino – see Table 4). With these conditions, $n=375$ for this model.

The second model estimates the determinants of tract transitions *to* high diversity at $t+10$ from other non-highly diverse tract categories at time t . Let $m_{hdt+10|it}^k$ be the number of tracts in category i at time t in metropolitan area k that transition to high diversity category hd by $t+10$. Define M_{it}^k as the total number of tracts in category i in metropolitan area k at time t . As before, we use a count model to predict the number of tract transitions *to* high diversity status:

$$m_{hdt+10|it}^k = M_{it}^k \exp(\gamma_i D_i + \delta_i D_i Y_t + \beta_i D_i X_{kt}). \quad (2)$$

All variables are defined as before except for the offset, M_{it}^k , which in this case accounts for the potential number of metropolitan specific transitions *from* each category i to high diversity status. The offset here means that the γ_i are estimates of the probabilities of transition to a highly diverse tract from category i at the mean centered values of the metropolitan predictors, δ_i estimates whether those transition probabilities to high diversity shift over the two decades, and the β_i measures the effect of metropolitan area characteristics on these transitions. As in the first model, the excluded factor from D_j is high diversity tracts, which means the constant term again measures the probability of high diversity tract stability and the δ_j and β_j main effects are measures of the effect of decade and metropolitan variables on this stability. The remaining δ_j and β_j coefficients allow for variation in these effects on types of transitions to high diversity.

The sample for this model is less restrictive because $M_{it}^k > 0$ in all metropolitan areas. Each metropolitan area has the potential to yield up to six observations as transition counts, which are for the six tract types that register a transition count to high diversity tracts of two or more in the set of all US metro areas (these are transitions counts from: high diversity, low diversity White, moderately diverse White, moderately diverse Black, moderately diverse Asian, and moderately diverse Latino – see Table 4). We drop from the analysis tract types with only one observed transition count to high diversity in both decades to make the model's γ_i estimable; this excludes a tiny number of observed transitions to high diversity from four categories: low diversity Black, low diversity Latino, moderate diversity Native American, and moderate diversity other race. Some metropolitan areas had fewer than six observations because they had no moderately diverse Black, Asian, or Latino tracts in the initial census period, and thus no possibility of a transition count from these tract types to high diversity between censuses. With these conditions, $n=1649$ for this model.

We estimate both models as negative binomial regressions because of overdispersion in the counts. The set of X_{kt} in both align with the metropolitan characteristics outlined earlier as potential drivers of highly diverse tract formation and transition. These are: the log of total population size at time t (logging improves the precision of the size effect because of the skewed distribution of metropolitan populations), metropolitan racial diversity (entropy) at time t , change in metropolitan diversity or entropy (metropolitan entropy at time $t+1$ minus metropolitan entropy at time t), and the Black percentage of a

metropolitan population at time t . All variables are mean-centered (the log population variable is centered at the mean logged value). In addition, the Black percentage and both entropy variables are scaled to have a standard deviation of one: a one-standard deviation change in these variables makes their effects easier to compare and interpret.

The full models include estimates for all metropolitan variables (as main effects *and* interactions with transition category) and are inferior (as determined by deviance improvement and AIC score) to more parsimonious specifications. We select the best model as that which requires the fewest main effects and interactions to yield the minimum AIC and for which the inclusion of any additional variables does not significantly improve deviance.

Using these criteria, the best fitting model for transition *from* high diversity status, the model in equation (1), includes all transition category and year interactions plus interactions of transition category with the log of population size, entropy and percent Black. Entropy change has no effect, thus expectations linked to the possibility of enhanced highly diverse tract stability associated with increasing metropolitan scale racial diversity are not met. Table 5 displays the exponentiated estimates all the main effects and significant interactions from this model. The deviance goodness of fit test indicates the model fit the data well, meaning we can confidently summarize transition probabilities from high diversity tracts across metropolitan areas with this limited combination of transition category, year, and metropolitan variable interactions. As the

excluded category is high diversity to high diversity transitions, the intercept, 0.431, is an estimate of the probability that a high diversity tract remains so ten years later at mean values of the metropolitan variables in the model. At these means, the category variables measure relative shifts in the transition probability from high diversity to other tract types. Accordingly, the transition probability to moderately diverse, White is 0.026 times lower than the probability of remaining highly diverse (i.e., $0.431 \cdot 0.026 = 0.011$), to moderately diverse Black it is 0.044 times lower (i.e., $0.431 \cdot 0.044 = 0.019$), and to moderately diverse Asian it is 0.06 times lower (i.e., $0.431 \cdot 0.06 = 0.026$). The probability that highly diverse tracts transition to moderately diverse Latino is not significantly different from remaining highly diverse (i.e., $0.431 \cdot 1 = 0.431$). The probabilities for the other effects are calculated in a similar manner, i.e. as the product of all relevant main effects and interactions. For example, the probability of a highly diverse tract becoming moderately diverse White in the 2000-2010 period is the product of the intercept, the moderate diversity White main effect, the 2000s main effect, and the interaction of the 2000s and moderate diversity White effects (i.e., $0.431 \cdot 0.026 \cdot 1.0 \cdot 9.801 = 0.109$). This means the probability of transition from highly diverse tracts to moderate diversity White increases by 0.109 from the previous decade.

Figure 1 illustrates all these probability calculations using significant coefficients in Table 5 ($p \leq 0.05$). The top left chart in Figure 1 reports the base transition probabilities (blue bars) from highly diverse tracts to the five tract categories for 1990-2000, calculated using the intercept and interactions of the intercept and tract category

variables. The four other charts show changes (red bars) in these base probabilities due to the time period effect (2000s), an increase of one in the log of metropolitan area population, a one standard deviation increase in metropolitan-area entropy, and a one standard deviation increase in the percent Black in a metropolitan area. The top middle chart shows the increase in probability of high diversity tracts transitioning to moderate diversity White in the 2000s—a period effect reflected in the observed increase in the number of transitions to moderately diverse White tracts from 2 in the 1990s to 77 in 2000s (see Table 4). The only other significant period effect is a small reduction in the probability of high diversity tracts transitioning to moderate diversity Asian. Population size affects only one transition type (Figure 1, top right). While transitions from highly diverse to Latino majority dominate (Figure 1, top left), the probability of tract transition from high diversity to moderately diverse Latino *decreases* by 0.126 percent for an increase of one in the log of population. This effect might be due to the dispersion of Latino populations across the US and down the urban hierarchy over the last 30 years (Lichter and Johnson 2009), leading to higher rates of high diversity tract succession to Latino majority tracts outside the largest metros. On balance, this suggests highly diverse tracts are more stable - less likely to transition to moderately diverse Latino - in the largest metropolitan areas.

Our *a priori* expectation was that more diverse metropolitan areas would have greater persistence in high diversity tracts. Our results indicate that this is not the case (bottom left chart): metropolitan entropy has no effect on the probability of high diversity tracts

remaining - i.e., transitioning to - high diversity. Higher metropolitan diversity levels do increase the range of transitions from high diversity tracts as expected, substantially increasing the probability of transitioning to moderately diverse Latino and Asian tracts. Increased metropolitan diversity means larger population shares of Asians and Latinos, increasing the probabilities that highly diverse tracts transition to neighborhoods dominated by these groups. There is no effect of increased metropolitan-area diversity on the probability of highly diverse tracts becoming White dominated, but it does reduce the probability, slightly, of their transitioning to moderate diversity Black. This aligns with the buffering hypothesis, wherein greater diversity through the presence of Asians and Latinos dampens the White response to Black presence, thereby reducing the likelihood that diverse neighborhoods turnover to Black majorities. Note: while this effect is statistically significant, it is small.

Increased Black share of a metropolitan area's population substantially reduces the probability that high diversity tracts remain highly diverse (bottom middle chart), as anticipated by the literature. The associated expectation is also true: increased chances of transition to moderate diversity Black tracts and lower probability of transition to moderately diverse Latino or Asian dominated tracts. A diverse metropolitan area with a large Black-population share thus has greater instability in its highly diverse tracts than in an equally diverse metropolitan area with a smaller Black population share. And in diverse metropolitan areas with large Black population shares, this elevated instability translates into a greater probability of high diversity tract transition to moderately diverse

Black. Such metropolitan areas will necessarily have relatively fewer Asians or Latinos available to “buffer” increases in Black neighborhood presence than in equivalently diverse metropolitan areas with smaller Black-population shares.

Turning to tract transitions *into* high diversity, the best fitting model has almost the same set of metropolitan predictors as in previous model (see Table 6, showing main effects and significant interactions only). The log of metropolitan population and percentage Black significantly improve the fit of this model as they do in the transition from high diversity model. Entropy *change* also improves this model’s fit. The absolute value of metropolitan entropy did not and was therefore dropped, which means levels of metropolitan diversity are not predictive of highly diverse tract formation. As before, the intercept estimates the probability that high diversity tracts remain as such at mean centered values of the metropolitan variables (0.269). This is a lower estimate of this probability than in Table 5. Some difference in this estimate is unsurprising given that we are using a different set of metropolitan variables and a larger number of metropolitan areas in our best model. All other categories, except moderate diversity Asian, transition into high diversity at a fraction of this probability (e.g., the transition probability from moderately diverse White to high diversity is just 4.4 percent of the intercept: $0.269 \cdot 0.044 = 0.012$). The moderate diversity Asian estimate is not significant, meaning these tracts transition to high diversity over 10 years at the same probability as high diversity tracts remain high diversity.

Figure 2 charts all of these probability calculations using significant coefficients from the relevant main effects and interactions ($p \leq 0.05$). The base transition probabilities (blue bars, top left chart), from the six categories to highly diverse tracts for 1990-2000, are calculated using the intercept and interactions of the intercept and tract category variables. The four other charts show the effect of time period, metropolitan area population, metropolitan area entropy change, and changes in the metropolitan percent Black on these base probabilities (red bars). There is no change in the probability of transition to high diversity from any tract category from the 1990s to the 2000s.

Larger metropolitan areas have a greater probability of high diversity tracts remaining highly diverse, which departs from the null effect of population on stability in the previous model. Again, this is likely a product of the larger set of metropolitan areas in this model, yielding greater variance in population size. There are also small but significant increases in probabilities that moderately diverse White, Black, and Latino tracts transition to high diversity as population increases, which accords with expectations on metropolitan area size and highly diverse tract formation. This result does not hold for moderately diverse Asian tracts, however; large populations reduce the likelihood of such a transition, probably because Asian residential enclaves in large metropolitan areas are consolidating or expanding through immigration-driven Asian population increases.

The estimates in Table 6 show that entropy *change* is only significant in interaction form, which means alterations in metropolitan diversity have no effect on the probability of transition from high diversity tracts to high diversity (see bottom left chart), consistent with our findings in the first model. Highly diverse tract stability is not enhanced by rising diversity in the wider metropolitan context, contrary to our hypothesis. For moderately diverse White, Latino, and Asian tracts, however, increases in metropolitan diversity produce modest increases in the probability that they become highly diverse. Rising metropolitan diversity boosts highly diverse tract formation from these three tract categories, which accords with expectations of increased neighborhood diversity in metropolitan places becoming more diverse. These probability increases are modest for Latinos and Whites because the initial base probabilities of transition are small. For instance, a one standard deviation increase in entropy over a decade raises the probability that moderately diverse White tracts become highly diverse by 43 percent (see Table 6). When multiplied by the base probability for moderately diverse White tracts transitioning to high diversity of 0.012, the increase in this transition probability is just 0.005. Note, though, that moderately diverse White tracts are the largest potential pool of neighborhoods in most metropolitan areas. Thus a small jump in transition probability means there is a substantial boost in high diversity tract formation from White tracts in metropolitan areas experiencing diversity growth. The opposite holds for moderate diversity Asian tracts, however. They have a high base transition probability to high diversity that, when multiplied by the diversity increase effect, yields a substantial

increase in the probability of transition to high diversity. The relatively small number of moderate diversity Asian tracts means this probability has a small effect on overall high diversity tract formation.

A one standard deviation increase in the Black share of a metropolitan area's population reduces the probability of transitions from high diversity to high diversity (i.e., highly diverse-tract stability) by 0.093 (bottom middle chart, Figure 2), which is very close to the estimate of the same effect in the previous model, reconfirming the expectation that large Black metropolitan population shares increase highly diverse tract instability. Black population share also drives down highly diverse tract formation as expected. The effect is particularly large from moderately diverse Asian tracts and much smaller from moderate diversity White and Black tracts. Overall, for moderate diversity Black, Asian, and White tracts, the response to increasing Black metropolitan population share is a slowdown in their transitions to highly diverse neighborhoods, perhaps because this racial composition reduces the odds of “cushioning” (Zhang and Logan's 2016, 1934) from Latino and Asians, yielding greater resistance to Black neighborhood presence in mixed residential spaces. Moderate diversity Latino tracts blur this picture by showing the opposite trend, though the effect is small.

CONCLUSION

The number of highly racially diverse census tracts in the United States grew considerably between 1900 and 2000 but then leveled off in the subsequent decade. These neighborhoods were mostly confined to a few very large metropolitan areas and were relatively unstable, reflecting in some ways what Denton and Massey (1991) observed for the decade of the 1980s. Almost all high diversity tracts develop as a result of transitions from moderately diverse tracts, and most of these source tracts have a White majority. Fewer than half of these high diversity tracts retain their status for more than a decade with the majority transitioning to a moderately diverse status. Latinos are the most frequent majority population that results from this succession process.

The transition rate from high diversity tracts did not shift much over the two decades of this analysis. What did change were the *types* of places that these tracts transitioned to. The 2000s witnessed a substantial acceleration of high diversity tract transitions to moderately diverse White dominated tracts, signifying that instability in highly diverse tracts is not solely a function of increasing minority and decreasing White presence between 2000 and 2010. The emergence of White majority spaces from high diversity is perhaps an indication of same preferences (Clark 1992) or gentrification. Whites may be attracted to these areas by their location, the price and quality of the housing stock, or because they valorize diversity in their residential environment. Moves for the latter reason have the ironic outcome of Whitening highly diverse areas, an outcome akin to the idea of “amenity paradox” (Jurjevich and Schrock 2012), wherein places attract people

based on a set of amenities and the subsequent population increases erode the very factors that drew the people there in the first place.

We found no evidence of higher levels of metropolitan-scale diversity modulating highly diverse tract stability. Diversity does change the *nature* of the transitions from high diversity tracts in expected ways, however, driving down the rate of transition to moderately diverse Black majority tracts and elevating it to moderately diverse Asian and Latino majority tracts. Metropolitan-level diversity itself may not matter for the stability of high diversity tracts but the relative share of the metropolitan population that is Black does. As this percentage increases so does the instability of high diversity tracts, with more succession occurring to Black majority neighborhoods. That Black population share increases the probability that high diversity tracts transition to a Black majority while diversity decreases it suggests there are opposing forces affecting the likelihood of Black neighborhood succession in American cities. High levels of diversity in a metropolitan area will mute (though probably not eliminate) the effect of high percentages of Blacks on the rate of high diversity tract succession to a Black majority. This is consistent with the hypothesis that the presence of Latinos and Asians in large numbers acts as a buffer for increased Black populations in mixed neighborhoods, thereby diminishing the rate at which those spaces undergo succession to Black majorities.

The effects of metropolitan context variables on highly diverse tract formation are largely as expected. Moderately diverse White and Black tracts, the two largest source categories

for high diversity tracts, become more likely to transition to high diversity with population size. Metropolitan-area diversity *increase* over a decade also drives up the rate at which moderate diversity White, as well as moderate diversity Latino and especially moderate diversity Asian tracts, transition to high diversity. The level of metropolitan diversity in the initial period, however, has no effect on whether a tract transitions *to* high diversity. The diversity increase effects are reversed in metropolitan areas with higher percentages of Blacks. These metropolitan areas have lower transition probabilities into high diversity tracts especially from moderately diverse Asian tracts but also from moderately diverse White and Black tracts. This result aligns with the view that Black entry or presence in mixed neighborhoods is constrained (e.g., Flores and Lobo 2013). Metropolitan areas with large Black percentages will thus be more limited in their high diversity neighborhood formation possibilities than those with smaller Black population shares. If high diversity tracts form in these high percentage Black metropolitan areas, our other model results suggest that the simultaneous presence of higher levels of metropolitan scale diversity will act as a brake on their succession to Black majorities.

We find a high degree of instability among our set of highly diverse tracts. That said, there are tracts that persist in a highly diverse state across three censuses and these spaces warrant further investigation into the factors that produce this stability. Sacramento is of particular interest here for, unlike other large metropolitan areas, it has numerous, stable, high diversity tracts. Certain types of transitions warrant additional investigation because of their considerable growth in the 2000s. Specifically, the dynamics and geographies of

highly diverse tract transitions to White dominance may be distinct from those in which a minority group becomes dominant and merit further research.

Note

¹ Holloway et al. (2012) explain how they reclassified multiracial individuals in 2000 and 2010 to make 2000 and 2010 census race categories conform to earlier single race census categories. In brief they allocated individuals reporting multiple racial categories in 2000 and 2010 to single racial categories using minority-preference proportional weighting. This is equivalent to the whole-race assignment method—largest group other than white—suggested by the US Office of Management and Budget (2000).

² Holloway et al. (2012) define low diversity tracts as those where $E_i \leq .3707$ (almost always this means one group has 80% or more of the tract's population); moderate diversity tracts have a tract entropy score in the range $.3707 < E_i < .7414$ (typically tracts in which one group has a majority of the population but diversity - there are more other groups present - than in the low diversity tracts; and as previously mentioned, high diversity tracts are where $E_i \geq .7414$, **and** no group has greater than 45% of the tract's population and no two groups have greater than 80% of the tract's population).

³ A tract that remains highly diverse over a decade (i.e., is stable) is modeled in this specification as a transition from highly diverse to highly diverse. While the mixedmetro scheme has 13 categories, not all experience transitions from or to high diversity. The models only include factors for categories with observed transitions.

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Table 1: The Metropolitan Bias of Highly Diverse Tracts

Year	All US	All MSAs	Largest 53 MSAs	Largest 53 MSAs (%)	Largest 10 MSAs (%)
1990	197	196	188	95	67
2000	878	868	811	93	72
2010	998	973	905	91	71

Table 2: Metropolitan areas with the most highly diverse tracts in 2010

Metropolitan Area	1990	2000	2010
New York	35	202	195
San Francisco	37	143	145
Washington DC	4	50	81
Los Angeles	35	100	70
Sacramento	22	63	66
Seattle	1	19	53
Houston	3	49	41
Minneapolis	5	27	39
Boston	7	28	31
Dallas	1	16	26
Philadelphia	3	11	18
Atlanta	2	10	17
Las Vegas	0	1	17

Table 3: Highly diverse tract attrition in four metropolitan areas with more than 20 highly diverse tracts in 1990

MSA	1990	2000	2010
New York	35	27	18
San Francisco	37	19	8
Los Angeles	35	10	4
Sacramento	22	22	15

Table 4: Highly Diverse Tract Transitions for all Metro Areas, 1990-2000 and 2000-2010

Highly Diverse Tracts Became:	1990-2000	2000-2010
White majority, Mod. Diversity	2	77
Black majority, Mod. Diversity	9	36
Asian majority, Mod. Diversity	17	66
Latino majority, Mod. Diversity	64	218
Remained Highly Diverse	104	471
Tracts transitioning to High Diversity:		
White majority, Low Diversity	18	2
White majority, Mod. Diversity	640	414
Black majority, Low Diversity	-	1
Black majority, Mod. Diversity	55	51
Asian majority, Mod. Diversity	17	11
Latino majority, Low Diversity	1	-
Latino majority, Mod. Diversity	31	23
Native American, Mod. Diversity	1	-
Some Other Race, Mod. Diversity	1	-

Table 5: Model of Transitions from High Diversity

Term	Estimate	p value
(Intercept)	0.431	0.000
Mod. Diverse White (MDW)	0.026	0.000
Mod. Diverse Black (MDB)	0.044	0.000
Mod. Diverse Asian (MDA)	0.060	0.000
Mod. Diverse Latino (MDL)	0.954	0.908
2000	1.091	0.573
Population(log)	1.139	0.104
Entropy	0.940	0.340
Percent Black	0.775	0.029
MDW:2000	9.801	0.003
MDA:2000	0.372	0.038
MDB:Entropy	0.337	0.000
MDA:Entropy	3.905	0.000
MDL:Entropy	1.425	0.048
MDW:Percent Black	1.539	0.032
MDB:Percent Black	3.257	0.000

Residual Deviance 283.7 $p(\chi^2, df=350) = 0.99$
AIC 864.1

The excluded category is High Diversity

The table shows all main effects and only significant interactions (indicated by “:” between the variable names) for the best fitting negative binomial model based on deviance reduction and AIC.

The estimates are exponentiated; thus the statistical significance of all estimates except the intercept is measured from one, not zero.

Table 6: Model of Transitions to High Diversity

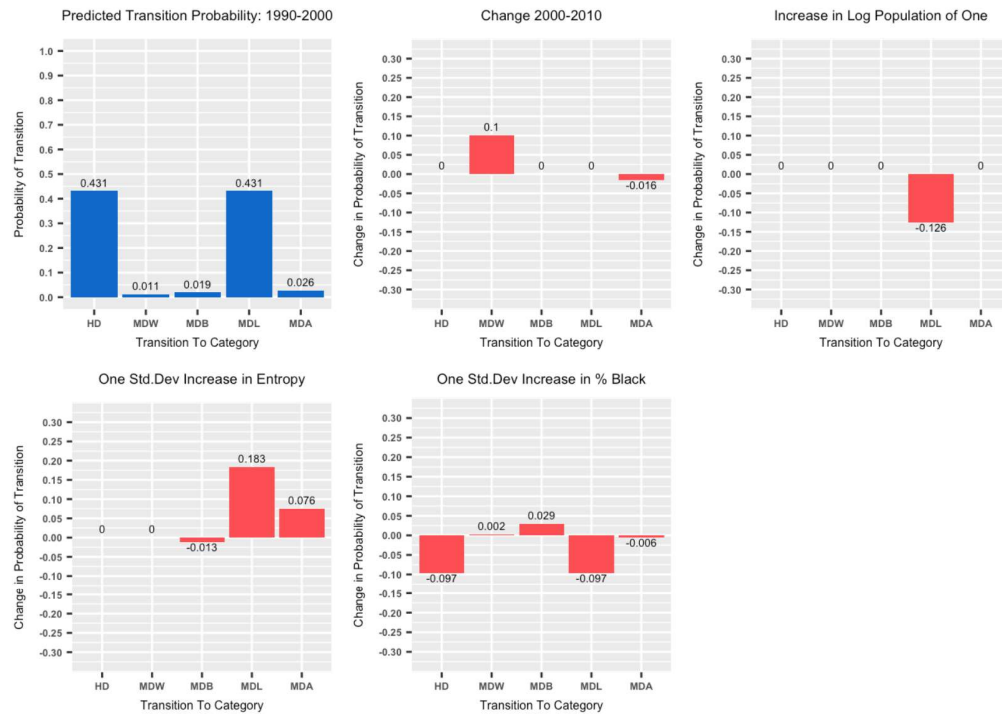
Term	Estimate	p value
(Intercept)	0.269	0.000
Low Diverse White (LDW)	0.000	0.000
Moderate Diverse White (MDW)	0.044	0.000
Moderate Diverse Black (MDB)	0.017	0.000
Moderate Diverse Asian (MDA)	0.283	0.120
Moderate Diverse Latino (MDL)	0.022	0.000
2000	1.349	0.182
Population(log)	1.163	0.044
Entropy change	1.139	0.185
Percent Black	0.655	0.007
LDW:Population(log)	3.377	0.000
MDW:Population(log)	1.505	0.000
MDB:Population(log)	1.671	0.009
MDA:Population(log)	0.557	0.003
MDW:Entropy change	1.432	0.005
MDA:Entropy change	2.186	0.000
MDL:Entropy change	1.448	0.031
MDB:Percent Black	0.426	0.036
MDL:Percent Black	2.288	0.026
Residual Deviance	564.7	$p(\chi^2, df = 1619) = 1$
AIC	1613.6	

The excluded category is High Diversity

The table shows all main effects and only significant interactions (indicated by “:” between variable names) for the best fitting negative binomial model based on deviance reduction and AIC.

The estimates are exponentiated; thus the statistical significance of all estimates except the intercept is measured from one, not zero.

Figure 1: Predicted Probabilities of Transition from High Diversity Tracts



The top left chart (blue bars) shows the predicted transition probabilities from High Diversity Tracts between 1990 and 2000 at mean values of the metro level variables. The other four charts (red bars) show predicted changes in these probabilities. These predicted probabilities and changes in probabilities are calculated using significant coefficients ($p \leq 0.05$) in column 1 of Table 5. See table 4 for translation of the category abbreviations on the X axis.

Figure 2: Predicted Probabilities of Transition to High Diversity Tracts



The top left chart (blue bars) shows the predicted transition probabilities to High Diversity Tracts between 1990 and 2000 at mean values of the metro level variables. The other four charts (red bars) show predicted changes in these probabilities. These predicted probabilities and changes in probabilities are calculated using significant coefficients ($p \leq 0.05$) in column 2 of Table 5. See table 6 for translation of the category abbreviations on the X axis.